Phytochem Rev (2009) 8:1–2
DOI 10.1007/s11101-008-9118-0

PREFACE

Phytochemistry reviews—special issue on glucosinolates

Jonathan Gershenzon · Caroline Müller

Published online: 30 December 2008

In the vast spectrum of plant natural products, glucosinolates represent only a small group of substances occurring in a restricted number of plant families. Nevertheless, research on glucosinolates has excited a large community of scientists intrigued by their chemistry, metabolism, molecular regulation, ecological roles and biological activities. While the parent glucosinolates have little biological activity by themselves, they are converted into active products by the enzyme myrosinase in conjunction with other proteins. Glucosinolates have been best studied in plants of the Brassicaceae because this family contains many crop species in which glucosinolates serve as flavoring agents, toxins and defense compounds. This family also contains the model species *Arabidopsis thaliana*, which offers a wide range of genetic and genomic resources that have been applied to glucosinolate research.

The present issue of Phytochemistry Reviews is based on the contributions of a number of leading glucosinolate investigators who presented their latest results at the First International Conference on Glucosinolates, entitled: "Glucosinolate Biology, Chemistry and Biochemistry, and its Application to Human Health and Agriculture" held at the Max Planck Institute of Chemical Ecology in Jena, Germany, from September 10–14, 2006. Here the contributors summarize recent work and review progress in some exciting areas of glucosinolate research.

The issue begins with several articles on glucosinolate biosynthesis that highlight some of the very impressive advances recently made in understanding glucosinolate pathways and their control by transcription factors and amino acid metabolism, as well as the role of modern molecular tools in facilitating these advances. Next are insightful reviews on glucosinolate localization and transport, the first comprehensive overviews of these topics. The chapter on glucosinolate localization also considers the localization of myrosinase which is crucial to the process of glucosinolate hydrolysis. This is followed by a fascinating account of specifier proteins which are emerging as important factors in influencing the direction of glucosinolate hydrolysis.

Ecological and evolutionary aspects of glucosinolates are featured in a series of chapters in this special issue. Glucosinolates mediate a wide range of interactions between plants and the insects, nematodes and microorganisms that infest them. Moreover, since glucosinolates can be taken up by herbivores and metabolized, their influence can be felt by predators

J. Gershenzon (✉)
Department of Biochemistry, Max Planck Institute, for Chemical Ecology, Hans-Knöll-Strasse 8, 07745 Jena, Germany
e-mail: gershenzon@ice.mpg.de

C. Müller (✉)
Department of Chemical Ecology, University of Bielefeld, Universitätsstr. 25, 33615 Bielefeld, Germany
e-mail: caroline.mueller@uni-bielefeld.de

and parasitoids all the way up to the fourth trophic level. These topics are covered here along with the effect of herbivory on the glucosinolate composition of plants, the pattern of glucosinolate allocation to above versus below ground organs and the localization of glucosinolates on the plant surface. As the Brassicaceae contain several species with a high invasion potential, knowledge on the role of glucosinolates in affecting plant invasiveness is also delineated. One chapter describes the ecology and evolution of a small gene family that has major impact on glucosinolate diversification.

Finally, the application of glucosinolates in human affairs is covered by chapters on the use of glucosinolate-containing plants as biofumigants in agriculture and the value of glucosinolates and their derivatives in human health by reducing the risk of carcinogenesis, cardiovascular ailments and neurodegenerative diseases.

We want to express our thanks to all authors who wrote reviews for this special issue and to all of our colleagues who took part in the review process. Furthermore, we thank the staff of Phytochemistry Reviews, specifically Noeline Gibson and Babylynne Andag for their support and patience. It was a great privilege and pleasure to edit these 20 contributions in the field of glucosinolates. We trust that the perspectives and insights expressed here will challenge some of our current assumptions and stimulate further research on this unique group of plant metabolites.